

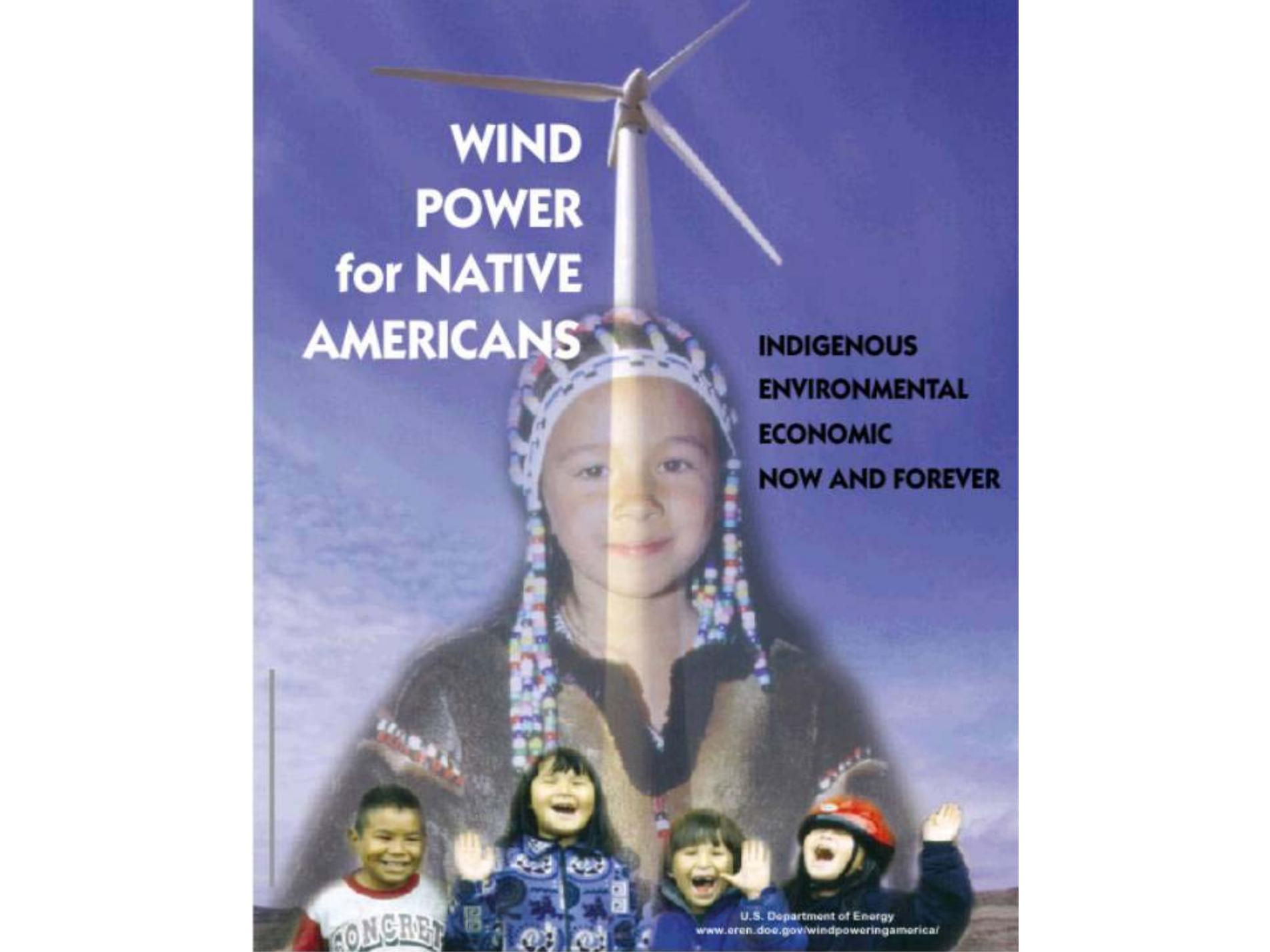
Wind Energy for Native Americans



Larry Flowers

Golden, CO

November 20, 2003



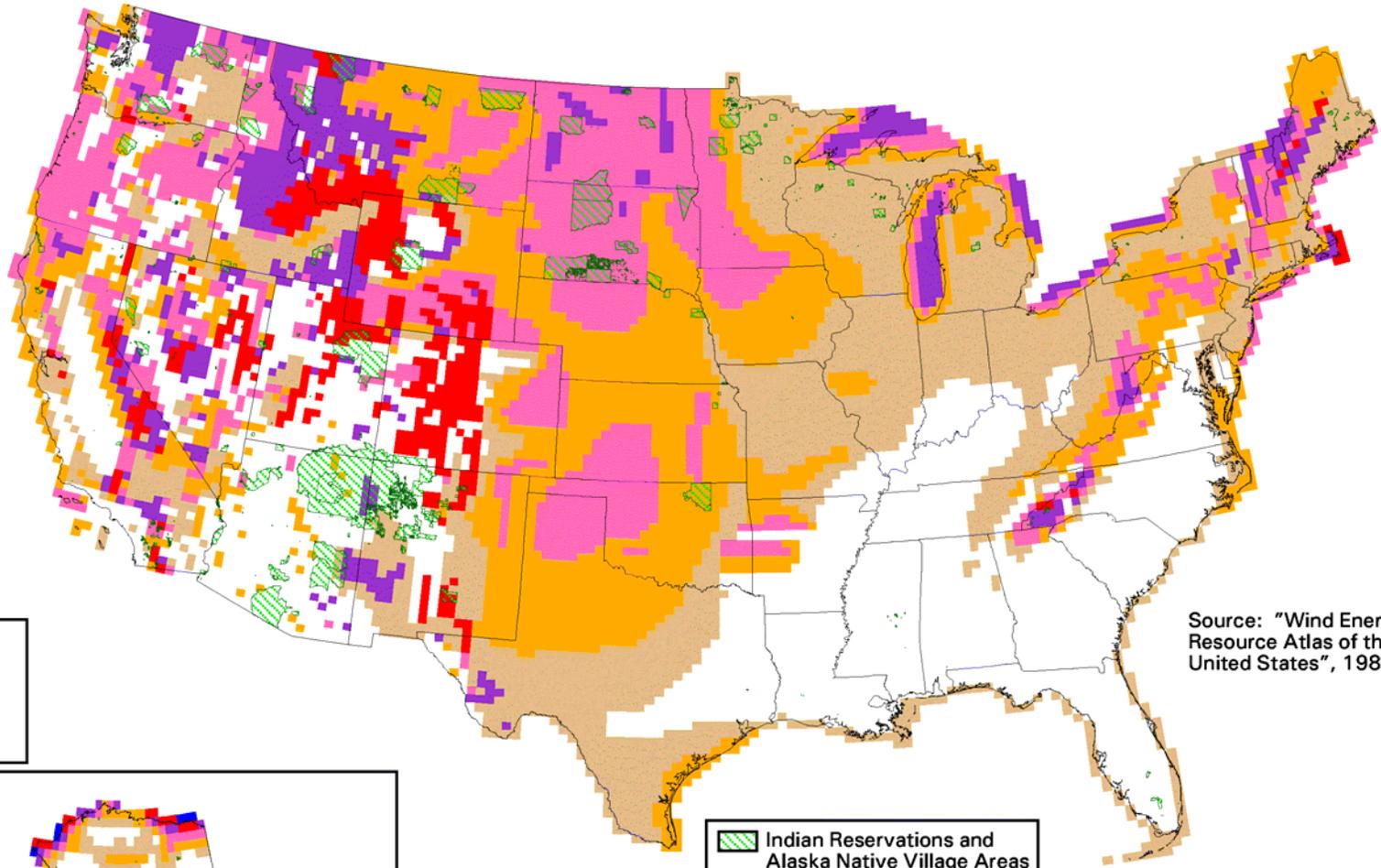
**WIND
POWER
for NATIVE
AMERICANS**

**INDIGENOUS
ENVIRONMENTAL
ECONOMIC
NOW AND FOREVER**

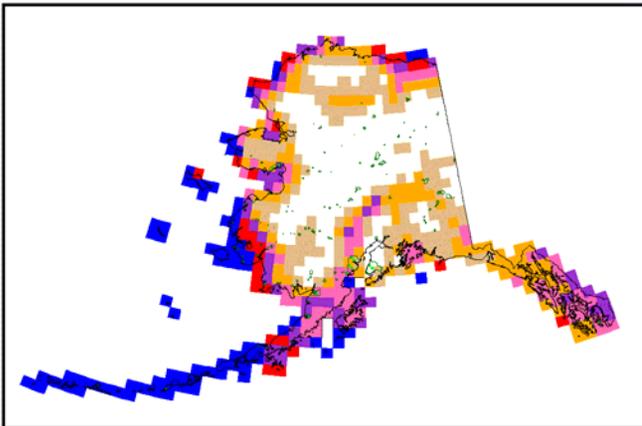
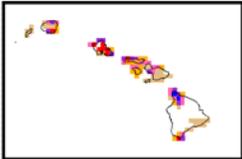
- NA wind resources
- On-site loads vs. export
- Investment vs. private developer royalties
- Tribal utility business development policies
- Transmission constraints vs. green tags opportunity
- Tax advantages/limitations
- (perceived) Private sector development risk
- Federal load aggregation/trust responsibility
- Hydro-wind firming
- NA Wind Interest Group



United States - Wind Resource Map



Source: "Wind Energy Resource Atlas of the United States", 1987



 Indian Reservations and Alaska Native Village Areas

Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m ²	Wind Speed ^a at 50 m m/s	Wind Speed ^a at 50 m mph
	2 Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
	3 Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
	4 Good	400 - 500	7.0 - 7.5	15.7 - 16.8
	5 Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
	6 Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
	7 Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

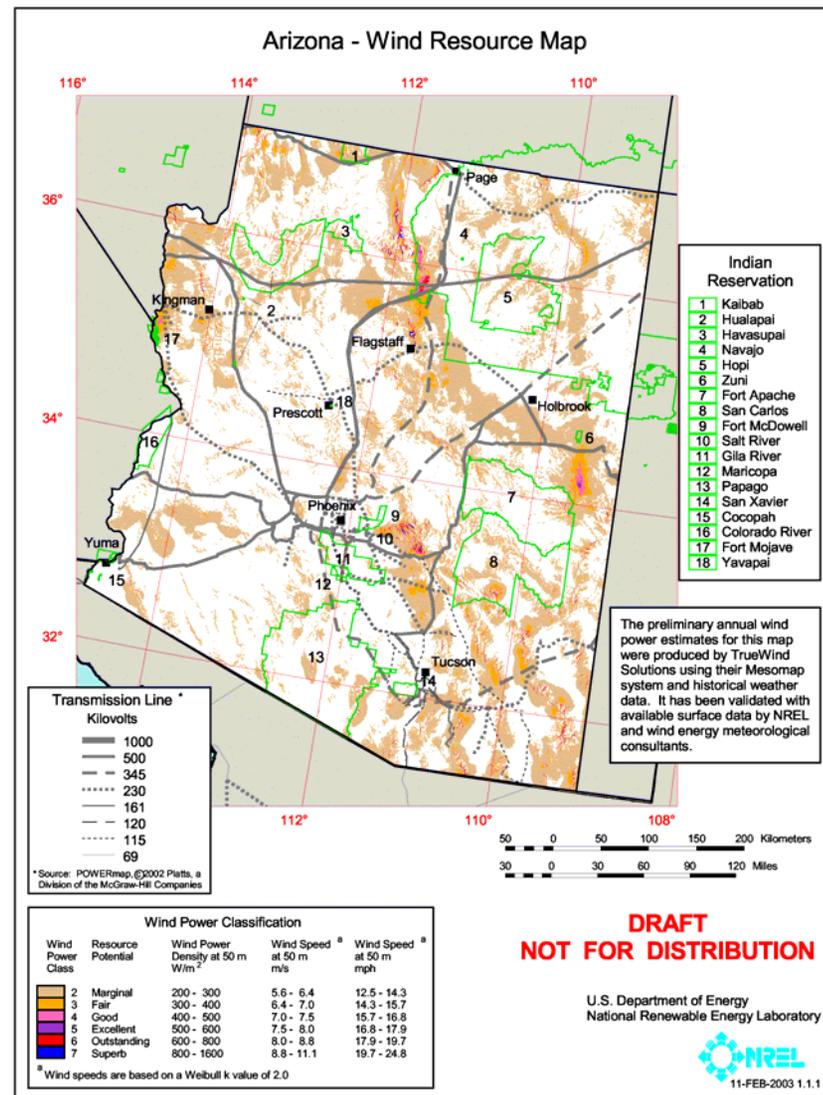
^a Wind speeds are based on a Weibull k value of 2.0

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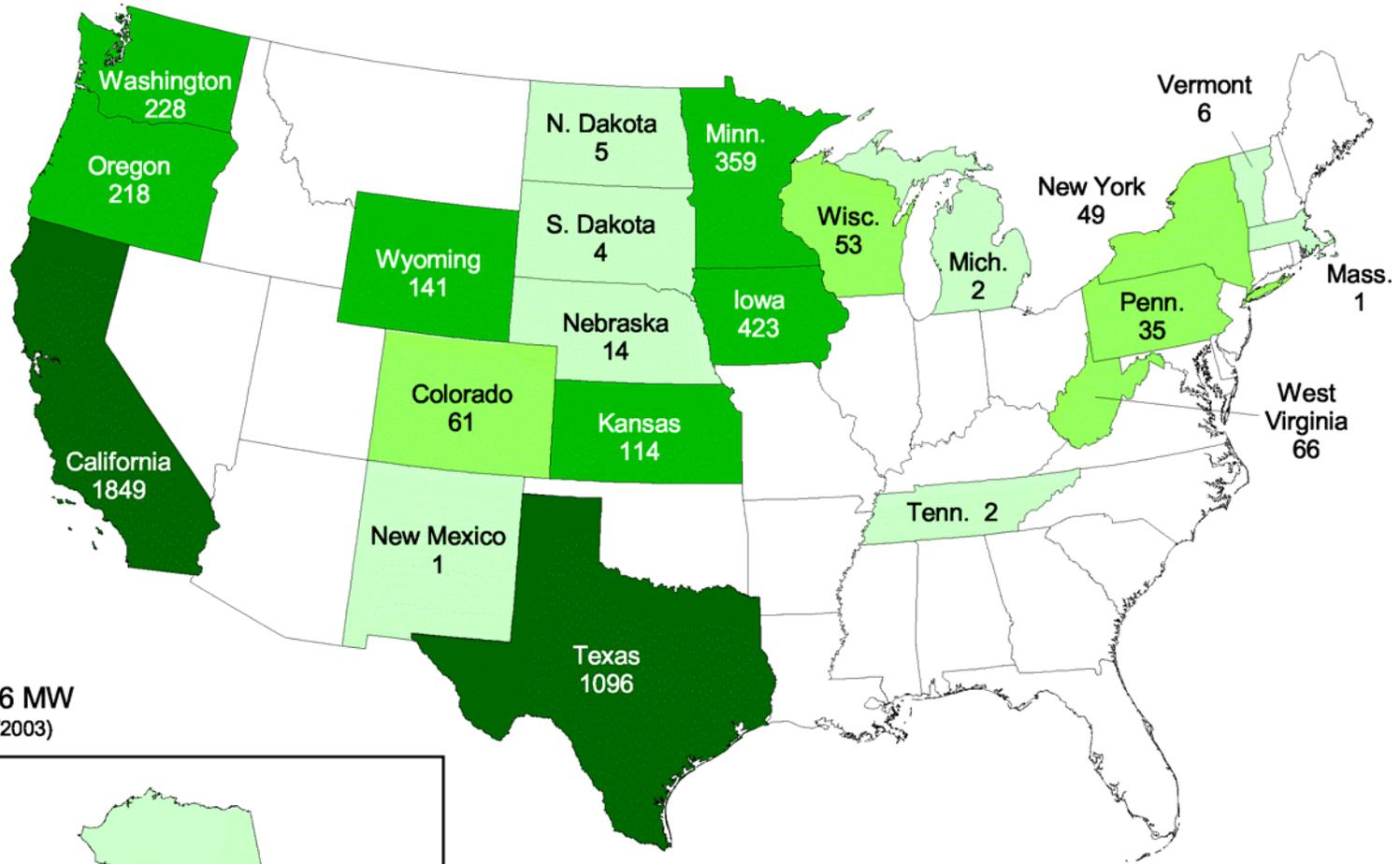
Wind Resource Mapping

- Identifies most promising areas for wind energy development
- Employs geographic information system technology to create layers of key information
- Used by state energy planners, Indian tribes, and developers

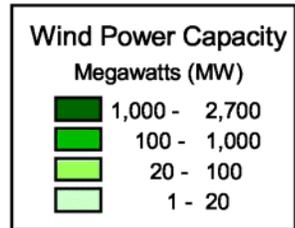
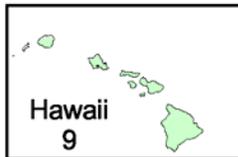


The preliminary annual wind power estimates for this map were produced by TrueWind Solutions using their Mesomap system and historical weather data. It has been validated with available surface data by NREL and wind energy meteorological consultants.

United States - Wind Power Capacity (MW)



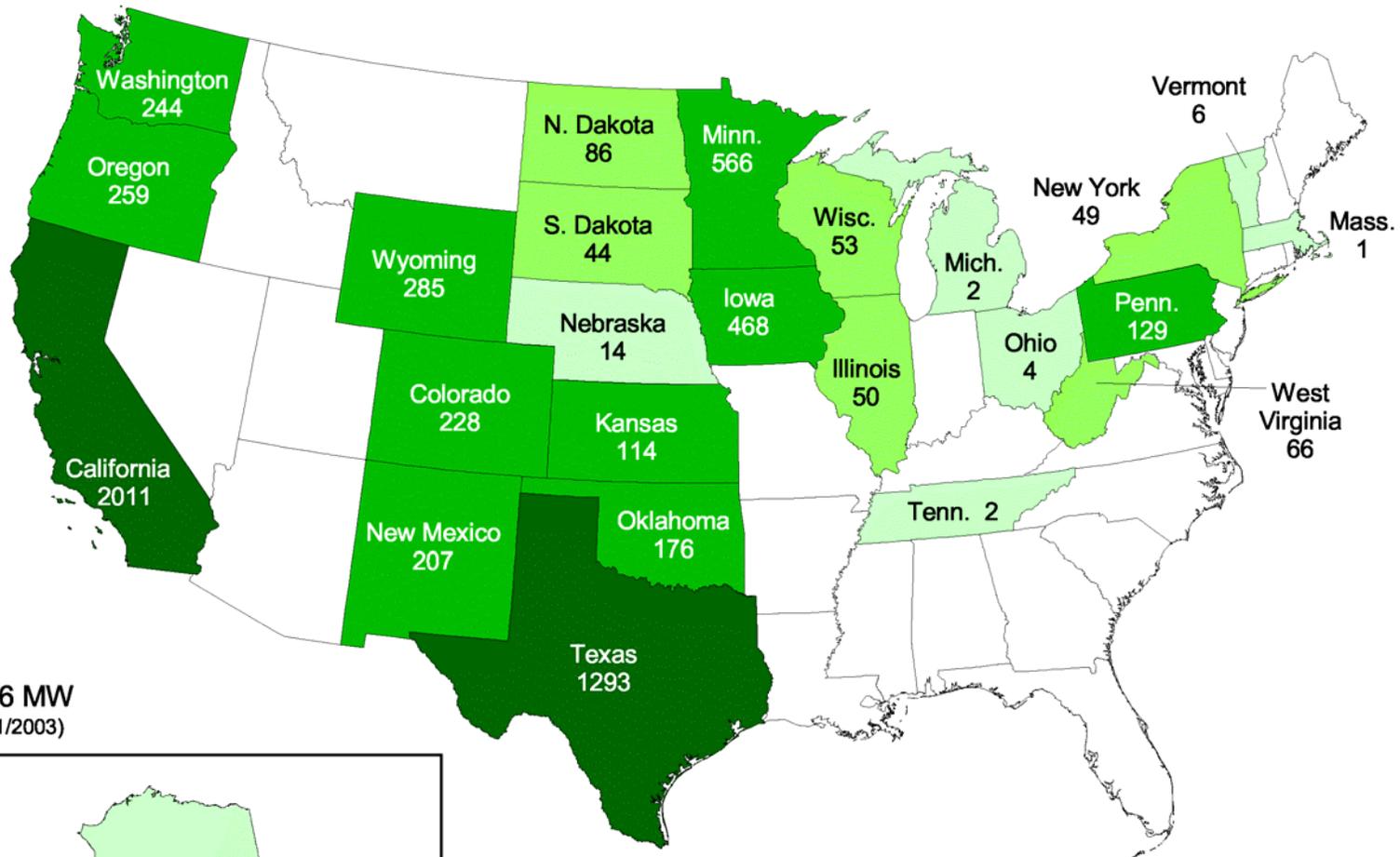
Total: 4,736 MW
(Updated 7/31/2003)



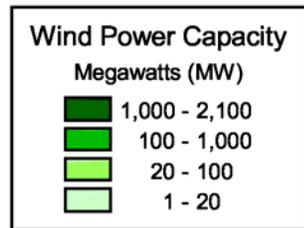
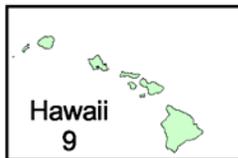
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United States - 2003 Expected Year End Wind Power Capacity (MW)



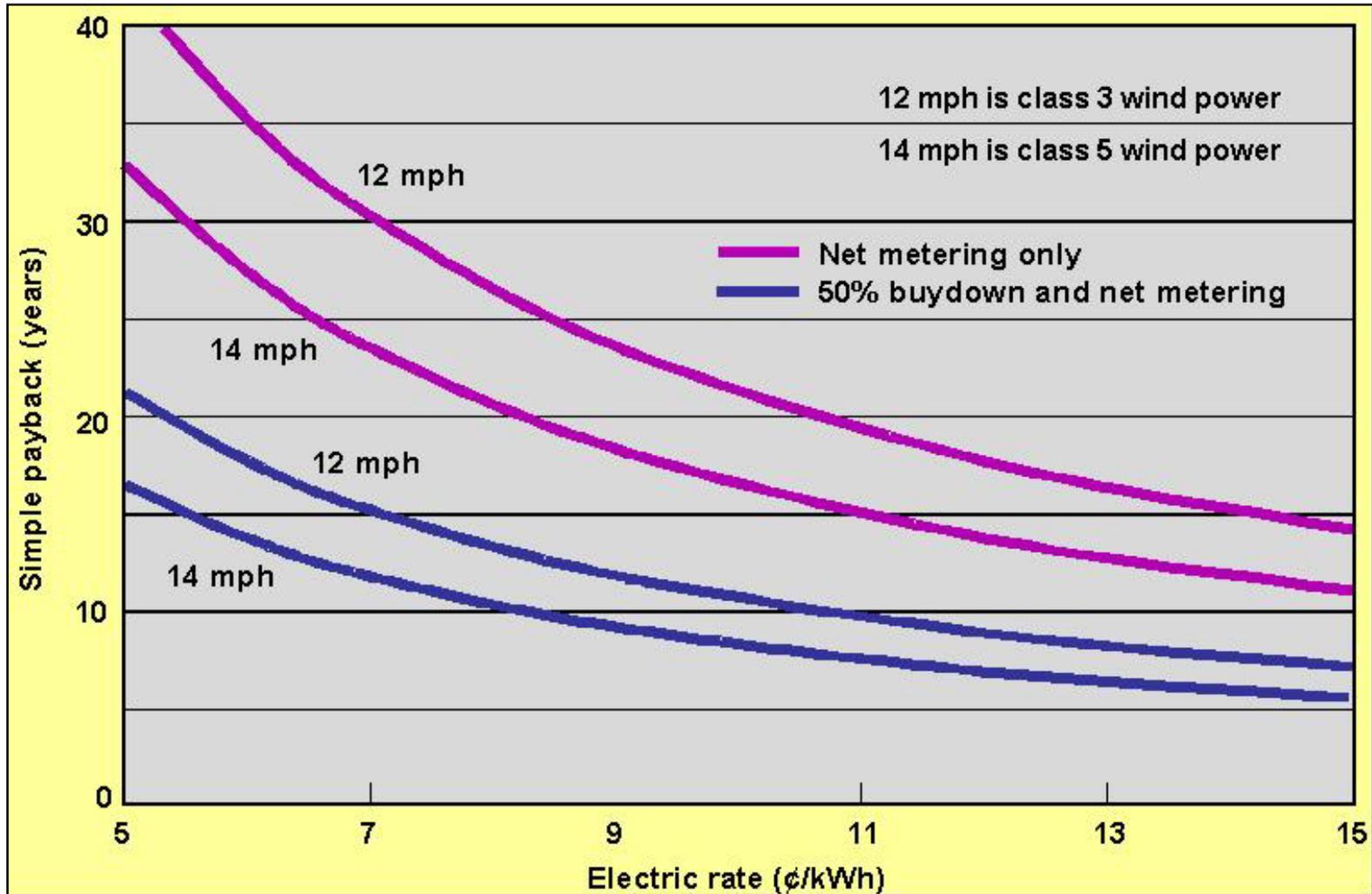
Total: 6,366 MW
(Updated 07/31/2003)



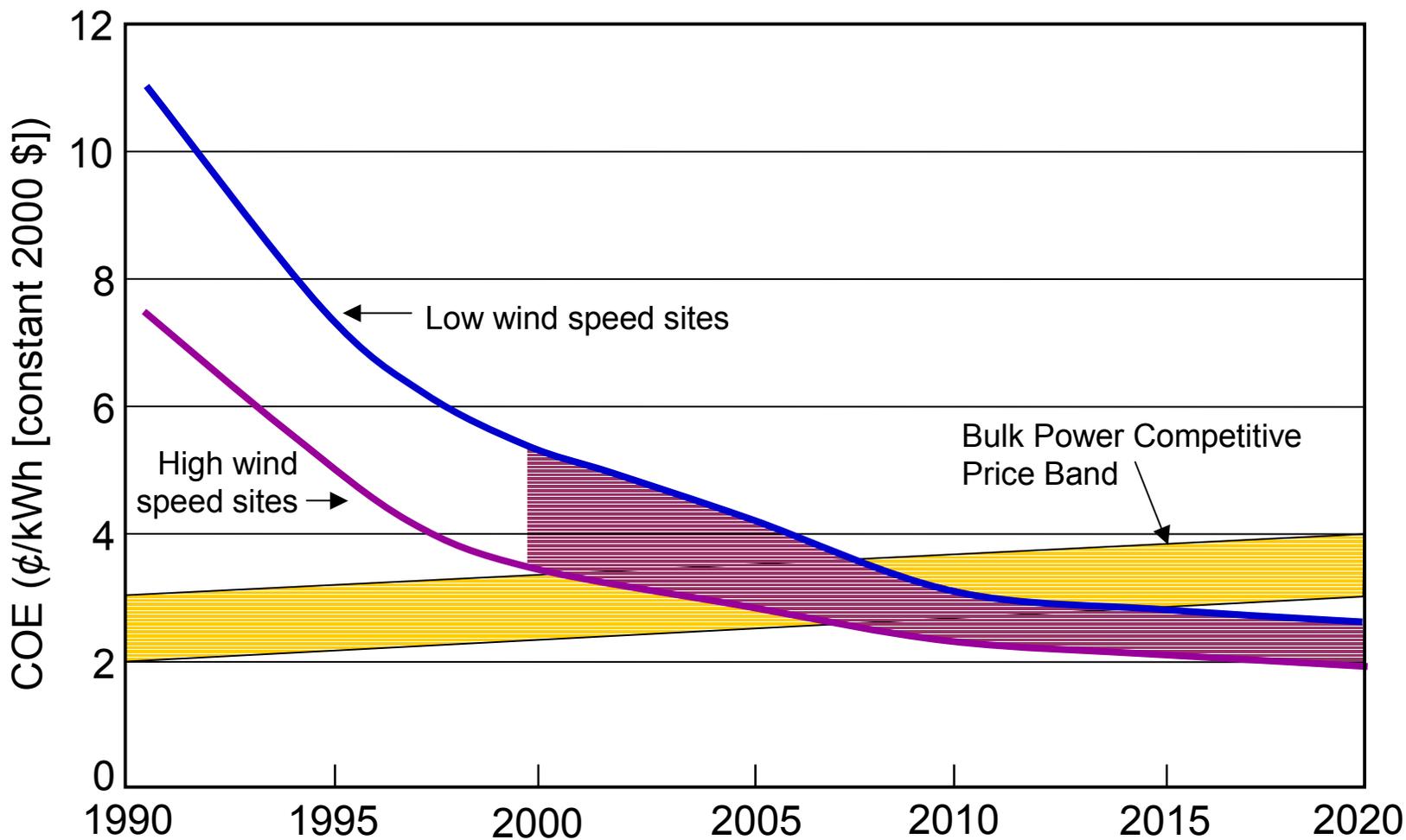
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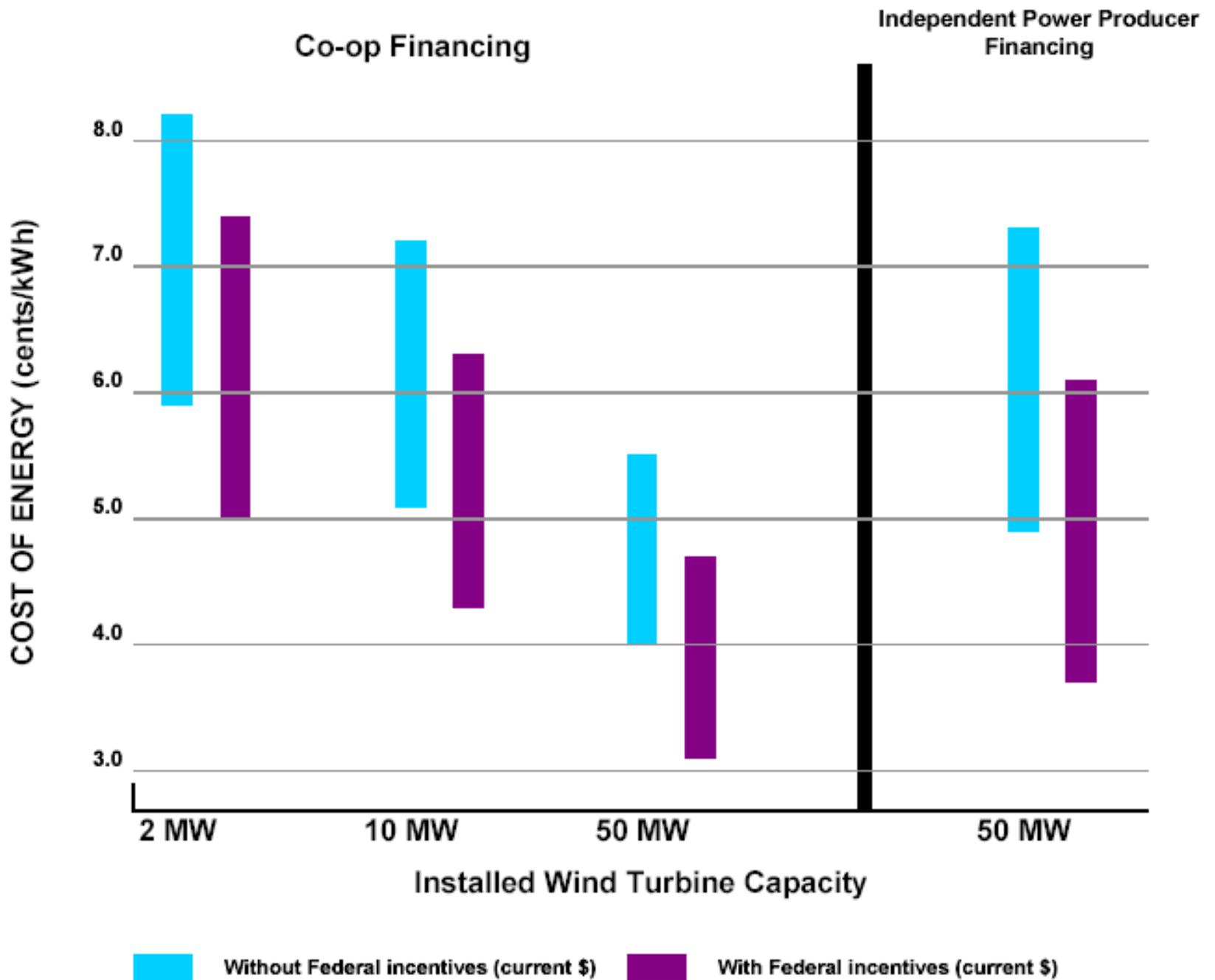


Incentives Make Small Wind Systems More Economical



Wind Cost of Energy





Westcliff, Colorado

- Turbine Size:
400W
- Turbine
Manufacturer:
Southwest
Windpower
- Application:
Off-grid
residential



Wheeler, Texas



- Turbine Size: 1 kW
- Turbine
Manufacturer: World
Power Technologies
- Application: Water-
pumping for 120
head of cattle

Marienthal, Kansas

- Turbine Manufacturer: Bergey
- Capacity: 10 kW



- Turbine Size: 50 kW
- Turbine Manufacturer: Atlantic Orient Corp.
- Developer/owner: Long Island Power Authority
- Capacity: .050 MW



Wales, AK



Capacity: .01 MW, Completed in 2001

Turbine Manufacturer: Atlantic Orient Corporation

Developer: Kotzebue Electric Association

Saint Paul Island, Alaska



- Turbine Size: 225 kW
- Turbine Manufacturer: Vestas
- Developer/owner: Northern Power Systems
- Capacity: .225 MW

Rosebud, SD



- Turbine Size: 900 KW
- Turbine Manufacturer: NEG Micon
- Turbine Owner: Rosebud Sioux Indian Reservation (Commissioned May 2003)
- PPA: Basin Electric
- Green Tags: Native Energy, US Air Force

Chamberlain, South Dakota

- Turbine Size: 1300 kW
- Turbine Manufacturer: Nordex
- Developer: Crown Butte Wind Power
- Capacity: 2.6 MW



Kimball, Nebraska



- Turbine Size: 1.5 MW
- Turbine Manufacturer: NEG Micon
- Developer/Owner: Municipal Energy Association of Nebraska (MEAN)/TVIG
- Capacity: 10.5 MW

Klondike, Oregon

- Turbine Size: 1.5 MW
- Turbine Manufacturer: GE Wind Energy
- Developer/Owner: Northwest Wind Power
- Capacity: 24 MW



Peetz, Colorado



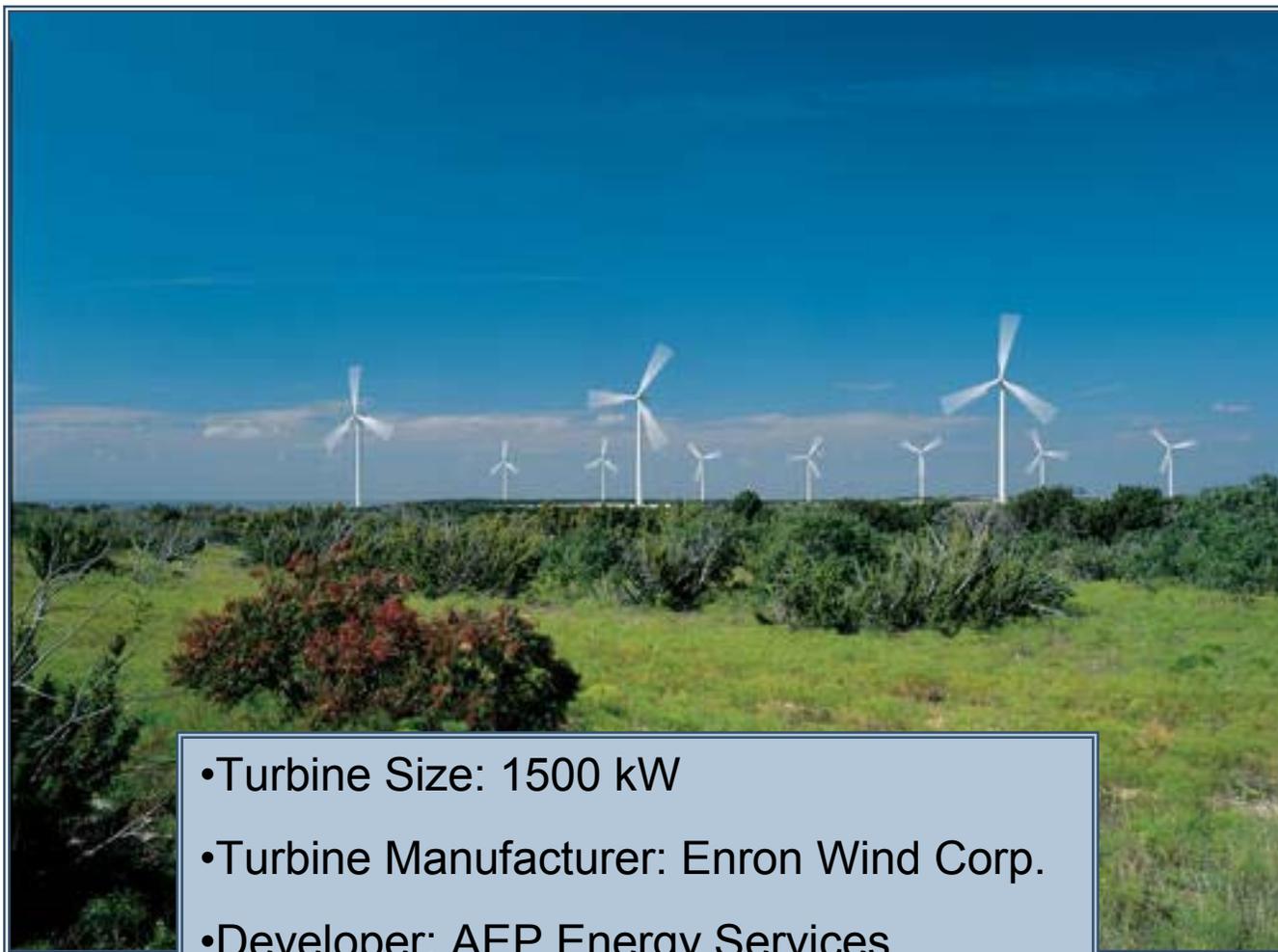
- Turbine Size: 900kW
- Turbine Manufacturer:
NEG Micon
- Developer: enXco
- Capacity: 29.7 kW

Carbon County, Wyoming

- Turbine Size: 1 MW
- Turbine Manufacturer:
Mitsubishi
- Developer/Owner:
SeaWest Wind
Power/Shell Renewables
- Capacity: 50 MW



Trent, Texas



- Turbine Size: 1500 kW
- Turbine Manufacturer: Enron Wind Corp.
- Developer: AEP Energy Services
- Capacity: 150 MW



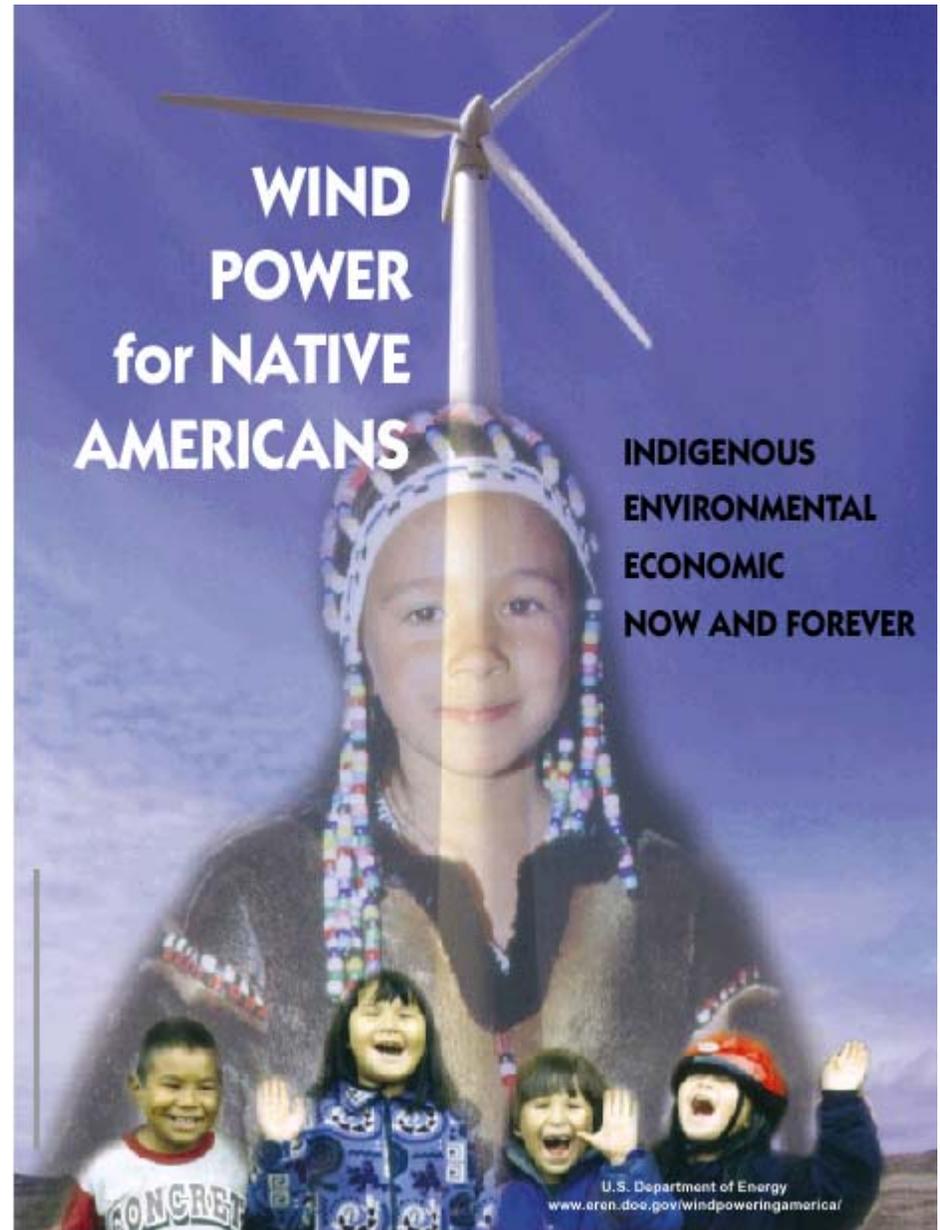
- Turbine Size: 660 kW
- Turbine Manufacturer: Vestas
- Developer/Owner: FPL Energy
- Capacity: 262 MW

Wind Development Parameters

Resource Characterization	Application/ Options Analysis	Policy Review
Environmental/ Cultural Review	Project Implementation & Operation	Interconnections Study
Permitting	Sales Agreements	Financing

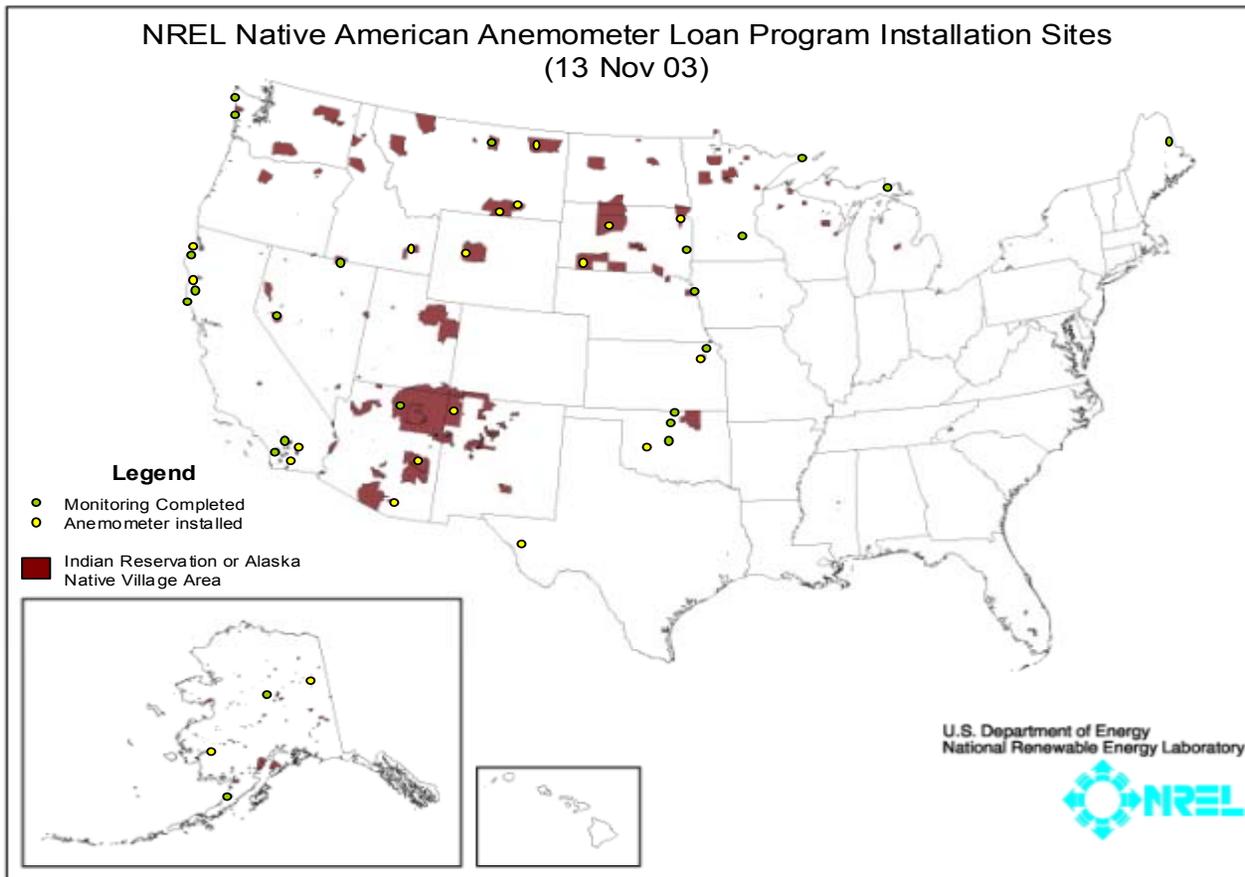
Native American Activities

- Native American outreach strategy development
- 16 regional NAWIG workshops
- 38 anemometer loans
- Lakota wind assessment options
- Tribal Wind Maps
- TA to DOE tribal RE grantees
- Tribal reps to WEATS
- NA section on WPA website
- NAWIG Newsletter



Native American Anemometer Loans

NREL Native American Anemometer Loan Program Installation Sites
(13 Nov 03)



Legend

- Monitoring Completed
- Anemometer installed
- Indian Reservation or Alaska Native Village Area

Installation Year

2000

- Bay Mills Indian Community - MI
- Hopi - AZ
- Rohnerville Rancheria - CA

2001

- Houlton Maliseet - ME
- Iowa Tribe of Oklahoma - OK
- Robinson Rancheria - CA
- Shakopee Mdewankan - MN
- Shoshone-Bannock - ID
- Ugashik Traditional Village - AK
- So boba Band of Luiseno Indians - CA
- Tanana Village - AK
- Walker River Paiute - NV
- Winnebago Tribe of Nebraska - IA
- Kaw Nation - OK
- Flandreau Sioux - SD
- Fort Peck - MT
- Fort Yukon - AK
- La Jolla - CA
- Quinault - WA
- Duck Valley - NV
- Pine Ridge - SD
- Otoe-Missuria - OK
- Fort Belknap - MT
- Fort Hall - ID

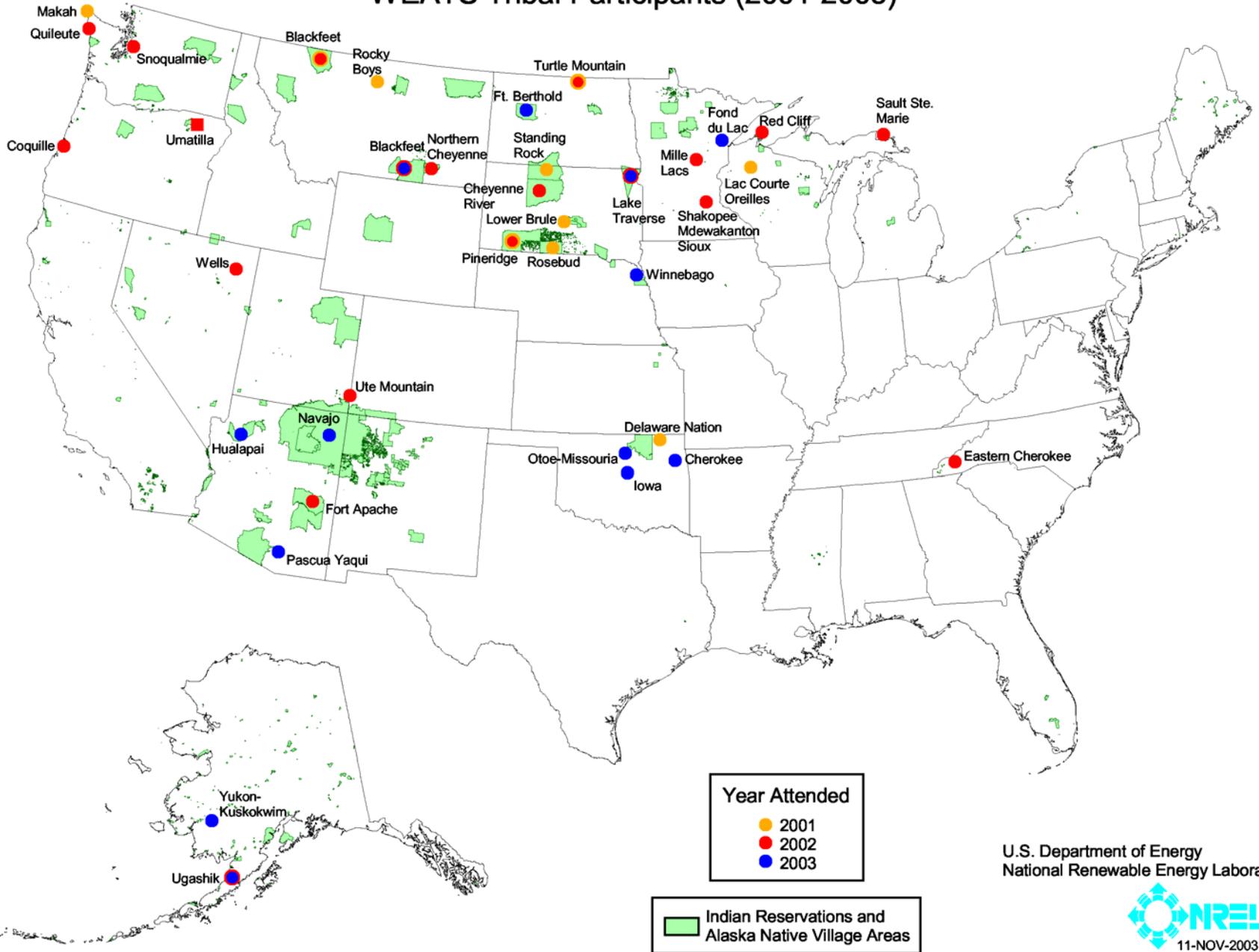
2002

- Caddo Nation - OK
- Sac & Fox - KS
- Navajo - AZ
- Sherwood Valley Rancheria - CA
- Quileute - WA
- Grand Portage - MN
- Potawatomi - KS
- Crow - MT
- Table Bluff Reservation - CA
- Sterets Point Rancheria - CA
- Sisseton - SD

2003

- Northern Cheyenne - MT
- Cheyenne River - SD
- White Mountain Apache - AZ
- Las Coyotes Band of Indians - CA
- Ysleta del Sur - TX
- Augustine Band of Mission Indians - CA
- Pascua Yaqui - AZ
- YKHC - AK

WEATS Tribal Participants (2001-2003)



Year Attended

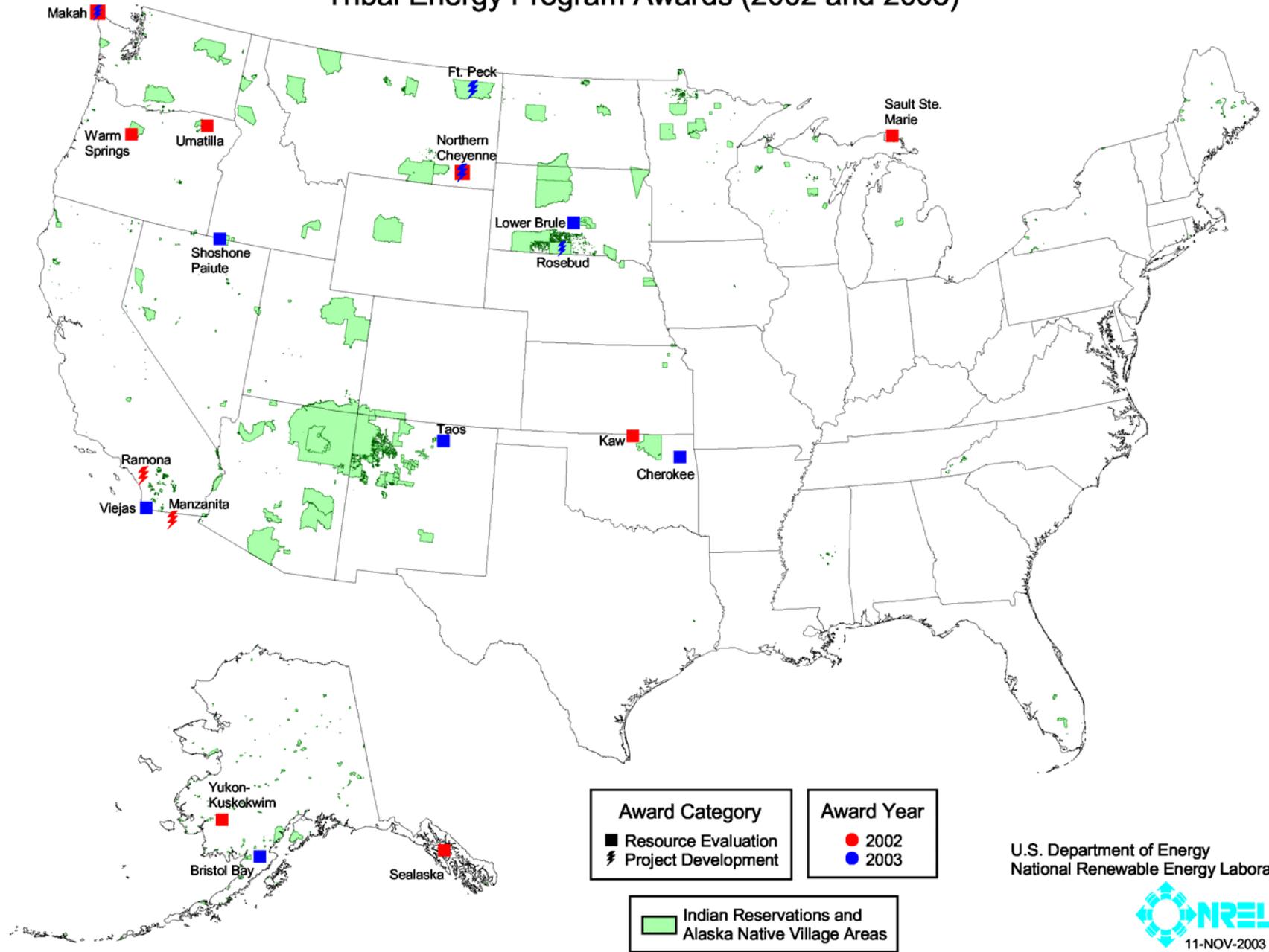
- 2001
- 2002
- 2003

Indian Reservations and Alaska Native Village Areas

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Tribal Energy Program Awards (2002 and 2003)



Award Category

- Resource Evaluation
- ⚡ Project Development

Award Year

- 2002
- 2003

Indian Reservations and Alaska Native Village Areas

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“In evaluating the potential of wind energy generation, Native Americans realize that wind power is not only consistent with our cultural values and spiritual beliefs, but can also be a means of achieving Native sustainable homeland economies.”

Ronald Neiss, Rosebud Utility Commission President, Rosebud Sioux Reservation, South Dakota

www.windpoweringamerica.gov